Numerous instruments for freezing and for hardening tissues are described.

Passing on to the various methods of hardening, the one which he prefers may be summarized as follows: A portion of the brain, about 3 cc in bulk, is surrounded by a little cotton-wool to permit contact on all sides with the hardening agents, then immersed in a couple of ounces of alcohol, and put in a cool place for 24 hours. The alcohol, which was used for the purpose of dehydrating the tissue and facilitating its subsequent permeation by the chromic fluids, is now replaced by Müller's fluid, which is changed in 3 days, and at the end of a week replaced by a 2 % solution of potassium bichromate. This solution, at the end of the second week, is increased in strength to 4 %, and the hardening is finally finished by a solution of chromic acid, $\frac{1}{6}$ %.

The hardening under these conditions is completed in from 4 to 8 weeks. Plain practical directions are given for embedding and for microtome section-cutting. His suggestions as to the details of staining and mounting are to follow.

T. Mitchell Prudden, M.D.

c.—PHYSIOLOGY OF THE NERVOUS SYSTEM.

Accuracy of Sight and Touch.—Prof. H. P. Bowditch and Dr. Southard have been comparing the senses of sight and touch. The method was as follows: The experimenter was seated at a table covered with a large sheet of white paper, upon which a small movable object was placed. After various experiments the most convenient object was found to be a small brass disc about five millimetres in diameter, having in the middle of one side a small projecting point. This object was placed in different positions on paper, a short rod being used for moving it about without touching it with the hand. The experimenter then having observed its position, closed the eyes and endeavored to place the point of the pencil held in the right hand as accurately as possible upon the disc. The error, that is the distance between the disc and the pencil point, was then measured and recorded. In a second set of observations the experimenter closed the eyes and placed the disc in position with the left hand. Then withdrawing the left hand and keeping the eyes still closed, he endeavored to place the pencil point upon it as before. In a preliminary series of experiments comprising sixty

trials, in half of which the position of the object was determined by sight, and in the other half by touch, it resulted that the knowledge of position in space obtained through the sense of sight is nearly twice as accurate as that obtained through the sense of touch. They also tried indirect vision, the effect of using the same or different hands in the localization and in search, the effect of time and fixation of the head, and arrived at the following results. The most accurate spatial knowledge is obtained by direct vision. At all the intervals the average error was less when the position of the object was determined in this way than by any other method. The effect of fixing the head is to diminish the accuracy of the localization, but even under these circumstances the errors are nearly in every instance less than those met with in the other methods of experimenting. The method next in accuracy is that of localization by touch with the same hand by which the movement in search of the object is executed, the head being free to move. Next in order of accuracy of localization come the two sets of experiments with indirect vision, that performed with reflected sunlight giving results slightly inferior to those of the other set. Least accurate of all the methods employed, is that of touch with the opposite hand. Direct vision gives the best results, that of touch with the opposite hand the worst, and the other methods occupy intermediate positions. In regard to time, it was found that with the increase of the interval between the determination of position of an object and the attempt to place the hand upon it with closed eyes, the accuracy of this movement at first increases and then diminishes, the maximum of accuracy being attained after an interval of two seconds.—*Foster's Journal of Physiology*, vol. iii, Nos. 3 and 4.

THE CEREBELLUM.—Spitzkà puts forth the opinion, founded on morphological data, that the cerebellum is a field where the impressions of touch and position are associated with those of time and space. Its main object is the fusion of the sensations or their co-ordination in some way for the benefit of the cerebral hemispheres. It is the informing depot to the great head-centre, the cerebrum. The cerebellum is but a by-tract for impressions conveyed by other channels, and only the finest co-ordinations of movement with regard to space and time are on anatomical grounds to be connected with the cerebellum. He confidently asserts that a fine musical ear, the sense of rhythm and time, and

the ability to perform any fine feats of equilbrium, are not possible without an intact and well-developed cerebellum.—*Jour. of Neurology and Psychiatry*, 1882.

THE CEREBELLUM.—Dr. Baginsky has made researches upon the cerebellum. It is well known from the experiments of Flourens, that cutting off layer by layer of the cerebellum causes in birds and mammals uncertain, staggering, and trembling movements; that the subjects operated on lose completely the power to move, to stand, or to fly. Baginsky's experiments were made on narcotized as well as on non-narcotized rabbits. By a longitudinal incision the skin of the occiput was divided, and the skull opened by means of a bone-forceps. Parts of the cerebellum were removed—either by the scissors or the knife. The results of his experiments were as follows: All the rabbits in which a large part of the cerebellar hemispheres were removed alone, or with a part of the vermis, show immediately after the operation notable disturbances. Weakened by the loss of blood, and conscious, they lie upon one or the other side; they cannot keep on their feet, or move from the place. Death of the animals ensued in a few days after the operation, and on *post-mortem* there was found destruction of nearly the whole cerebellum, or frequently complicated with hemorrhage into the medulla oblongata down to the medulla spinalis. Four rabbits lived a longer time, and in these only a small part of the vermis had been removed. After the removal of a small superficial part of the vermis the animal exhibited no disturbance of any kind in its movements, or in any other way from that of a normal animal. Only four animals lived longer, and they displayed, a few days after the operation, definite disturbances which were similar but of different intensity. There was trembling of the head and body, which was stronger when the animal was moved forward. In the movement of the feet they exhibited disturbances: the anterior extremity when moved is put down in a false manner; now it is the right, then the left, which is put down on the dorsum of the foot; sometimes the extremities are crossed over each other; sometimes one foot, sometimes the other foot is more extended, abducted, or adducted. Tests of sensibility gave no safe results, as rabbits react differently. These just-mentioned disturbances, at first weak, increase in intensity, till the death of the animal, between the second and fifth week

after the operation. B. arrives at the conclusion that destruction of the vermis alone, and of the anterior upper part of the vermis, only (Northnagel, to the contrary) calls out disturbances of the equilibrium. B. also made experiments upon dogs, with similar results. He also saw that these disturbances were gradually compensated for, and the question arose if this compensation took place through the cerebellum, or through other paths, perhaps the cerebrum. Under this idea Prof. Munk extirpated for him, on a dog, the sensory centre of the anterior extremity ; the cerebellum had been previously operated upon. The dog exhibited the same symptoms as a normal one does whose corresponding sensory centre had been extirpated. Hence, subcortical apparatuses, and highly probably in the cerebellum itself, are contrivances which learn anew to take on the function of the extirpated part. We have in the cerebellum itself, as Munk has shown in the cerebrum, the same peculiarity about the substitution of function.—*DuBois und Reichert's Archiv.*, Sechste Heft., 1881.

THE RAPIDITY OF TRANSMISSION OF NERVE-FORCE.—René has made a large number of experiments upon the rate of transmission of nerve-force in man. In the first series of experiments he placed the pulp of the left index finger upon the two knobs of a small apparatus of DuBois, set into activity by four Leclauché elements.

The thumb of the right hand presses upon the knob of the interrupting lever of Gaiffe. The apparatus is so arranged that when the current is thrown into the induction apparatus, an electric signal, which is in communication with the Gaiffe interrupter, marks the passage of the current. When the person perceives in the left index finger the current induced, he presses immediately upon the knob of the interrupting lever, which produces a new movement of the electric signal, which returns to its first position. The registering cylinder is set in motion by a water motor of Bourdon, and generally makes two revolutions per second. A tuning-fork of two hundred and fifty double vibrations writes down the rate of movement. The time between the two acts was found to be $\frac{21.2}{100}$ of a second, representing the time necessary to excite the pulp of the index finger, the transmission of the sensation to the brain, the act of will to transform the sensation into a movement which is transmitted to the thumb of the right hand, and to move it. This time diminishes as the intensity

of the electric irritation increases. In another series of experiments he sought to eliminate the time involved in the cerebral act, and to estimate the time of an act purely reflex. Every thing was arranged as in the preceding series of experiments, but the interrupter was removed. He attached to the index finger, placed upon the two knobs of the induction apparatus, a fine metallic thread, so as to make a break in the current, when the index finger is moved from its position—an interruption of the current, which is immediately registered by the electric signal. The same index finger at the same time receives the electric shock, and excites the movement. The will has not time to interfere, the movement being absolutely reflex. The time between the two movements was $\frac{16}{100}$ to $\frac{15.6}{100}$ of a second, being the time of a reflex act. Now, by taking the difference between the duration of a voluntary act and that of a reflex act, we have the approximative duration of a cerebral act, being elementary as possible. Thus $\frac{19.2}{100} - \frac{15.6}{100}$ or $\frac{16}{100} = \frac{3.4}{100}$ of a second, as the time involved in a cerebral act.

In the third series of experiments, instead of the electric irritation of the index finger, he used irritation of the auditory nerve. The lever of the interrupter was held in the right hand, the thumb pressed upon the knob, that is to say, broke the current as soon as he perceived the sound produced by a small hammer striking on a hollow metallic cylinder, and forming at this moment a current, and thus making the pen of the electric cylinder move. The ascent of the pen indicates the production of the sound, and the descent shows the moment when the thumb presses the knob of the interrupter. This interval between the ascent and descent of the pen was found to be $\frac{17.9}{100}$ of a second. Now, by taking the difference between the number $\frac{21.2}{100}$ of the first series of experiments (the left index finger upon the knobs of the coil and the thumb pressing upon the button of the interrupter) and the number $\frac{17.9}{100}$, we obtain $\frac{3.3}{100}$ of a second, representing the time of transmission of a sensory impression upon the length (about 95 centimetres) of nerve from index finger to nerve centres. It is presumed here that the latent period of excitation of the nerves of the finger and that of the auditory nerve are the same. The time of $\frac{3.3}{100}$ of a second for 95 centimetres of length of sensory nerve would give a rate of transmission of nerve force in a sensory nerve as 28 metres per second. He also made a series of experiments at different lengths along the arm and leg, but arrived at the same rate as a mean.—*Gazette des Hôpitaux*, Nos. 35, 36, 39, 1882.

The Cerebral Circulation.—François-Frank has been making some experiments upon the intracranial circulation during the arrest of the heart. It is well comprehended that when the blood ceases to flow to the brain that no vacuum can exist between the walls of the skull and the brain itself. It is necessary that something should replace the arterial blood. It was not the cephalo-rachidian fluid, as was easily demonstrated by a ligature upon the spinal cord preventing its return to the brain. By the aid of registering apparatus, he demonstrated that on the side of the sinus the pressure was equal to the general cephalic pressure. During the arrest of the heart the veins swell, especially in the deep parts, and particularly in the cranial cavity. The arterial anemia is replaced by a venous congestion.—*Gazette des Hôpitaux*, No. 37, 1882.

The Action of Nerves on the Sympathies.—Bert and Laffont have studied the action of the nerves on the lymphatics, and discovered that the mesenteric nerves exert a direct constrictive action upon the chyliferous vessels supplied by these nerves, and that the splanchnic has a dilating action upon the same vessels.—*Gazette des Hôpitaux*, No. 33, 1882.

The Act of Rotation.—Bechterew has made a series of experiments upon dogs in regard to rotation of animals on their long axis after injuries to the brain. He arrives at the conclusion that not only injury to the middle and posterior cerebellar crus, and deep injury to the medulla oblongata, produce rotation, but that lesion of the inner part of the crus cerebri in its whole course, from the thalamus to the pons, can also generate it. When the inner part of the crus cerebri is injured the rotation is about the uninjured side, whilst a lesion of the external layer of the crus cerebri causes rotation about the side of injury. The rotation about the long axis is produced through a lesion of those fibres which go from the cerebellum through the upper part of the crus cerebri to the corpora quadrigemina.—*St. Petersburger Med. Wochenschrift*, No. 6, 1882.

The Cerebral Circulation.—Gley has studied the influence of the intellectual act upon the cerebral circulation. He used a cardiographic tambour upon his own carotid. A philosophical

lecture, a geometric demonstration, and arithmetical operation were used to excite the activity of the brain. He observed during the intellectual work: 1. Augmentation of the number of beats of the heart, which appears to be in direct ratio to the attention. 2. Dilatation of the carotid artery and most marked dicrotism of the carotid pulse. 3. These characteristics persist after cerebral activity has ceased. These effects are neither cardiac nor respiratory, but vaso-motor changes.—*Revue des Sciences Médicales*, tome xix.

THE RESPIRATORY CENTRES.—Langendorff and Nitchsmann have studied the spinal centres of respiration. It has been shown long ago by several observers that centres exist in the spinal cord, which, by reflex activity, can carry on the respiratory act. They proceeded to determine if these centres are automatic as well as reflex. When the medulla oblongata is severed from the spinal cord and the flow of blood is arrested by artificial respiration, then after a short period independent respiratory movements are set up. The chances of this return of respiration are greater the younger the animal. If after section of the medulla oblongata a dose of .0005–.001 gr. of strychnia is given, then there ensue some convulsions, which in a short time are shortened and weakened by artificial respiration. After they are over, then suddenly, in the midst of the artificial respiration, violent respiratory movements ensue, but after a minute or two the breathing slows, and usually at the same time is deeper. The frequency corresponds, in general, to that of a normal animal. Not only is there rhythmic movement of the diaphragm, but coördinated respiratory movement of a distinct group of muscles, after removal of the medulla oblongata. They conclude, from these experiments, that spinal respiratory centres display automatic as well as reflex activity.—*Archiv. für Physiologie*, 1880, sechstes Heft.

A REGULATING NERVOUS SYSTEM OF THE RESPIRATION.—Dr. J. C. Graham has discovered a new regulating nervous system of the respiratory centre. If, in a rabbit, after opening the abdomen (the thorax unopened), as long a piece as possible of the splanchnic is prepared (which is easiest on the left side), a section is made of it, and the central end is laid upon electrodes, then the breathing is arrested in a state of expiration, the diaphragm is in a state like in an extreme expiratory act, and the

expiratory muscles of the abdomen in the state of strongest contraction. This experiment succeeds when the two vagi and sympathetics in the neck are divided. This experiment is said to be very suitable for a demonstration at a lecture, as it never fails. After section of the medulla oblongata in its most anterior part, so that connection with the brain is cut off, still the experiment succeeds. After section of the spinal cord between 11th and 12th dorsal vertebræ the experiment still ensues. After section of the spinal cord between the 4th and 5th dorsal vertebræ then the experiment fails. These facts prove that the fibres run in the sympathetic and thus enter the spinal cord, and then ascend to the medulla oblongata. This irritation of the splanchnic succeeds when the animal is in a state of dyspnœa or apnœa. *Archiv für die gesammte Physiologie*, Band xxv, Heft. 7 and 8.

THE RESPIRATORY CENTRES.—Langendorff found with Longet and others that, after section in the median line of the medulla oblongata, respiratory movements of both halves of the diaphragm continue synchronously. He saw the state of affairs to alter when the vagus nerve or both are divided: the frequency and depth of the contraction of the two halves of the diaphragm were not synchronous. By division of the vagus on one side the breathing on that side was slower than upon the other. He thinks that the true centres of respiration are in the spinal cord and that the oblong medulla has the centres regulating their action. *DuBois' Archiv.*, 1881, Heft. 1 and 2.

THE INHIBITION OF SPINAL RESPIRATORY CENTRES.—Langendorff has made some experiments upon irritation of the medulla oblongata. He holds that the respiratory centres are seated in the spinal cord; he tries to explain Flourens' experiment why, after injury to the medulla oblongata, or after cutting away of this part of the brain, the breathing is usually arrested. First, he takes the position that the mechanical injury to the medulla oblongata is a shock to the spinal centres lying in the neighborhood. He believes the medulla oblongata is the seat of a regulatory or inhibitory centre whose impulses go to the spinal centres of the respiratory nerves. The mechanical irritation of this apparatus or its paths, by a section or puncture, produces a lasting inhibitory effect upon the activity of the spinal centres. The existence of an inhibitory apparatus in the medulla oblongata is a

necessary conclusion, for in the central trunk of the vagus, inhibitory fibres run partly from the two laryngeal nerves, and partly from the lungs, and find their next station in the medulla. The question then arises : is one in position, through irritation of the medulla oblongata, to inhibit the respiration of an animal? He tried electrical, mechanical, and chemical irritation. The experiments were mainly made upon rabbits. He thinks that his results may be explained by the view, that in the medulla oblongata are centres whose irritation inhibit the respiration, and that it can be held that the section into the medulla not only irritates this apparatus but also exerts a shock upon the spinal respiratory centres lying in the neighborhood.—*DuBois' Archiv.*, 1881, sechste Heft.

ISAAC OTT, M.D.

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d.—MENTAL PATHOLOGY.

FOLIE À DEUX.—Moranda de Montezel, in a recent communication in the *Annales Medico-Psychologiques*, made the following division of the types of folie à deux: folie communiquée, folie imposée, and folie simultanée. The latter term is certainly not justified. There is no essential relationship between two cases of insanity arising at the same time among members of the same family, unless they exhibit the same delusions. In two cases reported recently by Dr. Whittaker (*Cincinnati Lancet & Clinic*, March 4, 1882), both husband and wife became progressive paretics under precisely the same circumstances, yet no one would think of classing these cases as cases of folie à deux, but, according to Dr. Montezel's dogma, they should be so classed. It would seem, therefore, that Dr. Montezel's term of folie simultanée unnecessarily complicates the subject. *The Chicago Medical Review*, March 25, reports the following interesting example of this psychosis, which occurred in a very striking phase recently at Andouille, France. Every member of a family of six persons at the same time became insane. Father and mother, both 64 years old ; the two sons, 30 and 27 ; the two daughters, 28 and 24 years old, think they have been poisoned by witches, and that the Devil is in their clothes. They see him constantly and everywhere, day and night, and, as they assaulted everybody they met, it has, therefore, become necessary to put the whole family in an insane asylum. Here the delusions are obviously derived from the members of the family first becoming insane. Similar extended in-